Math 1060 – Exam 1 Review

DO THIS ON A SEPARATE PIECE OF PAPER!

Part I: No Calculator

Find the measures of two angles, one positive and one negative, that are coterminal with the given angle.

1. 245° 2. $\frac{2\pi}{5}$ 3. –179° 4. $-\frac{\pi}{12}$

Convert the angle to radians. Leave as a multiple of π.

5. 210° 6. 72° 7. –135° 8. –15°

Convert the radian measure to degree measure.

9. $-\frac{2\pi}{3}$ 10. $\frac{4\pi}{9}$ 11. $\frac{11\pi}{6}$ 12. $-\frac{7\pi}{5}$

For the given angle, name the quadrant in which the terminal side lies.

13. –200° 14. 1568° 15. $-\frac{13\pi}{8}$ 16. $\frac{19\pi}{4}$

Given that $\csc\alpha = 5$ where α is in Quadrant 2, find the exact values of all remaining trigonometric functions.

17. $\sin\alpha =$ $\cos\alpha =$ $\tan\alpha =$ $\sec\alpha =$ $\cot\alpha =$

Find the exact value of the following expressions without using a calculator.

18. $\sin\left(\frac{2\pi}{3}\right)$ 19. $\tan\left(\frac{5\pi}{6}\right)$ 20. $\cos 225°$ 21. $\sec 270°$

22. $\csc\left(\frac{3\pi}{4}\right)$ 23. $\cot 330°$ 24. $\sin\ -60°$ 25. $\cos\left(-\frac{5\pi}{3}\right)$

26. $\tan\ -45°$ 27. $\sec\left(-\frac{7\pi}{6}\right)$ 28. $\csc\ -270°$ 29. $\cot\ -\pi$

Solve the problem using the Pythagorean Identity.

30. Find $\sin\alpha$, given that $\cos\alpha = \frac{8}{17}$ and $\sin\alpha > 0$.

31. Find $\cos\alpha$, given that $\sin\alpha = -\frac{4}{5}$ and $\cos\alpha < 0$.

32. Find $\csc\alpha$, given that $\cos\alpha = \frac{7}{9}$ and α is in quadrant IV.

33. Find $\sec\alpha$, given that $\sin\alpha = \frac{5}{8}$ and α is in quadrant II.

Verify the Identity. Assume that all quantities are defined.

34. $\frac{1-\cos(\theta)}{\sin(\theta)} = \csc(\theta) - \cot(\theta)$ 35. $\csc(\theta) - \sin(\theta) = \cot(\theta)\cos(\theta)$ 36. $\frac{1}{1+\cos(\theta)} = \csc^2(\theta) - \csc(\theta)\cot(\theta)$

Graph the following functions. Determine the amplitude, period, phase shift, and vertical shift of each.

37. $y = -2\cos\left(2x + \frac{\pi}{2}\right) - 1$

38. $y = 3\sin\left[2\left(x - \frac{\pi}{6}\right)\right] + 1$

Graph the following functions. Determine the period, phase shift, vertical shift, and the equations of the asymptotes.

39. $y = \csc\left(x + \frac{\pi}{2}\right) - 1$

40. $y = -4\sec\left(2x + \frac{2\pi}{3}\right)$

Graph the following functions. Determine the period, phase shift, vertical shift, and the equations of the asymptotes.

41. $y = \tan\left(\frac{\pi}{4}x - \frac{3\pi}{4}\right)$

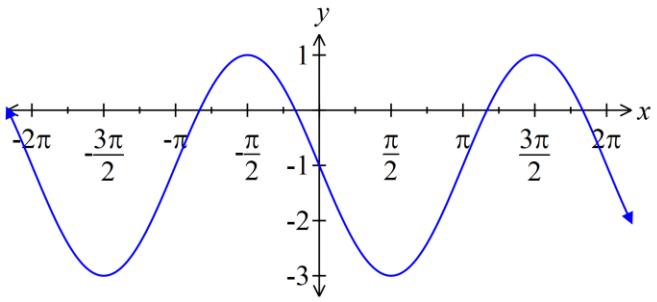
42. $y = \frac{1}{2}\cot x - 1$

Find the equation for the curve in its final position:

43. The graph of $y = \sin(x)$ is shifted $\pi/4$ to the left, stretched by a factor of 3, translated 5 units up, then reflected in the *x*-axis.

Determine the equation of the function that is graphed.

44.



45. The voltage *E* in an electrical circuit is given by $E = 5.2\cos(20\pi t)$, where *t* is the time measured in seconds. Find the frequency of the function (that is, find the number of cycles or periods completed in one second.)

Find all angles which satisfy the given equation.

46. $\csc(\theta) = 2$

47. $\cos(\theta) = \frac{\sqrt{3}}{2}$

48. $\tan(\theta) = 0$

49. $\sec(\theta) = -\frac{2\sqrt{3}}{3}$

Part II: Calculator

Find the length of the arc intercepted by the given central angle α in a circle of radius r.

50. $\alpha = \frac{\pi}{4}$, $r = 12$ ft

51. $\alpha = 60°$, $r = 2$ m

52. $\alpha = 1.3$ rad, $r = 26.1$ in

Find the area of a sector with the given central angle α in a circle of radius r.

53. $r = 6$ yd, $\alpha = 30°$

54. $r = 16$ ft, $\alpha = \frac{2\pi}{3}$

55. $r = 8$ in, $\alpha = \frac{\pi}{4}$

Solve the problem.

56. A wheel with a 20-inch diameter is turning at the rate of 45 revolutions per minute. To the nearest inch per minute, what is the linear velocity of a point on the rim?

57. An engine is "turning over" at 2300 rpm. Express this angular velocity in rad/min.

58. Find the angular velocity in radians per second and the linear velocity in inches per minute for a point on the edge of a 12-in.-diameter record spinning at $33\frac{1}{3}$ rev/min.

Solve the right triangle with the given sides and angles.

59. $\alpha = 34.6°$, $c = 9.4$

60. $a = 3.2$, $\alpha = 21.3°$

Solve the problem.

61. Robin Hood plans to use a 30-ft ladder to reach the castle window of Maid Marion. Little John, who made the ladder, advised Robin that the angle of elevation of the ladder must be between 55° and 70° for safety. What are the minimum and maximum heights that can safely be reached by the top of the ladder when it is placed against the castle wall?

62. The angle of elevation to the top of a giant redwood tree from a spot 80 ft. from the base of the tree is 75°. How tall is the tree?

63. From a boat on the lake, the angle of elevation to the top of a cliff is 21°17'. If the base of the cliff is 432 feet from the boat, how high is the cliff (to the nearest foot)?

64. From the top of a cliff that is 40-m. high, the angle of depression to an object that is level with the base of the cliff is 34°43'. How far is the object from the base of the cliff?

Find the equations of motion for the given scenario. Assume that the center of the motion is the origin, the motion is counter-clockwise and that $t = 0$ corresponds to a position along the positive x-axis.

65. A point on the edge of a yo-yo used in the trick 'Around-the World' in which the performer throws the yo-yo so it sweeps out a vertical circle whose radius is the yo-yo string. Assume the yo-yo string is 28 inches long and the yo-yo takes 3 seconds to complete once revolution of the circle.

66. A point on the edge of the circular disk in a computer hard drive. The circular disk has a diameter of 2.5 inches and spins at a rate of 7200 revolutions per minute.